Alacritech® Accelerator Users Guide

Preface

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Organization of This Guide

This guide is the primary reference and operation guide for Alacritech Accelerators and contains the following sections:

Chapter 1 - Introduction provides a general introduction to Alacritech Accelerators and the SLIC Technology on which they are based.

Chapter 2 - Software Installation includes the procedures required to install the software component and configure the operating system for correct operation.

Chapter 3 –Operations and Management provides the procedures for monitoring and maintaining Accelerator performance and procedures for special server circumstances.

Chapter 4 – Configuring Teaming and Failover supplies instruction on how to set up EtherChannel or 802.3AD compatible teams and hot standby failover.

Chapter 5 – Alacritech Accelerator Installation in Windows Powered NAS Appliance outlines special procedures to be followed to install an Alacritech Accelerator into a Windows Powered NAS appliance.

Chapter 6 – Troubleshooting and Support provides a list of possible problems and their solutions.

Appendix A - Network Software License Agreement and Warranty provides the text of the License Agreement to use the software component and the Limited Media Warranty for the software media.

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1 Introduction

1.1 About this Guide

This guide describes how to install software and operate Alacritech Accelerators on a Windows 2000, Windows XP or Windows Server 2003 system. 100 Series (100x4, 100x2 and 100x1) Accelerators are not supported with this release, but will continue to be supported under earlier releases with a major number of 6.

1.1.1 Naming conventions

The general term **Accelerator** for this release applies to all of the following products:

TCP/IP Offload Engine (TOE) NICs (TNICs):

- 1000x1 Single-Port Gigabit Server and Storage Accelerator
- 1000x1F Single-Port Gigabit Server and Storage Accelerator (1000BASE-SX)
- SEN2002XT Dual-Port Accelerator
- SEN2002XF Dual-Port Accelerator (1000Base-SX)
- SEN2001XT Single-Port Accelerator
- SEN2001XF Single-Port Accelerator (1000Base-SX)
- SEN2104ET Quad-Port Accelerator
- SEN2104EF Quad-Port Accelerator (1000Base-SX)
- SEN2102ET Dual-Port Accelerator
- SEN2102EF Dual-Port Accelerator (1000Base-SX)

iSCSI Controllers:

- SES1001T iSCSI Accelerator
- SES1001F iSCSI Accelerator (1000Base-SX)
- SES2002XT Dual-Port iSCSI Accelerator
- SES2002XF Dual-Port iSCSI Accelerator (1000Base-SX)
- SES2001XT Single-Port iSCSI Accelerator
- SES2001XF Single-Port iSCSI Accelerator (1000Base-SX)
- SES2104ET Quad-Port iSCSI Accelerator
- SES2104EF Quad-Port iSCSI Accelerator (1000Base-SX)
- SES2102ET Dual-Port iSCSI Accelerator
- SES2102EF Dual-Port iSCSI Accelerator (1000Base-SX)

Product names ending with a T specify unshielded twisted pair (UTP) copper connections, and product names ending with an F indicate fiber-based connections. XT and XF products are PCI-X based, and ET and EF products are PCI Express (PCIe) based.

1.2 Description

Alacritech Accelerators are single-port or multi-port network interface cards (NICs) that employ Alacritech's SLIC (Session-Layer Interface Card) Technology, which uses an innovative application-specific integrated circuit (ASIC) for protocol processing. Accelerators operate with Windows 2000, Windows XP and Windows Server 2003 operating systems.

SLIC Technology® increases server performance and efficiency in two specific ways:

- TCP/IP Protocol processing is offloaded onto the Accelerator, freeing the CPU for application processing and maximizing throughput.
- A unique ASIC utilizes an Internet Protocol Processor (IPP), optimized for TCP/IP protocol processing, which delivers faster performance than general purpose CPUs.

SLIC Technology eliminates the burden of TCP/IP protocol processing on the host CPU. By offloading protocol processing, SLIC Technology frees the CPU for application processing, boosting both network and server performance.

2 Software Installation

2.1 Software Installation Overview

This chapter covers the installation of the software required for an Accelerator under Windows 2000, Windows XP and Windows Server 2003. There are different procedures for different types of installations, so take care to follow the correct procedure. The following types of situations are covered:

- Installation during the installation of the Windows operating system
- Installation into an existing Windows system
- Updating the drivers for an existing Accelerator installation
- Uninstalling the Accelerator

Note: Alacritech's SLIC Technology requires the installation of additional components not typically required by a network adapter to support the TCP offload capabilities of the Accelerator. All installations must be done with the Alacritech Setup utility.

2.2 Software Installation

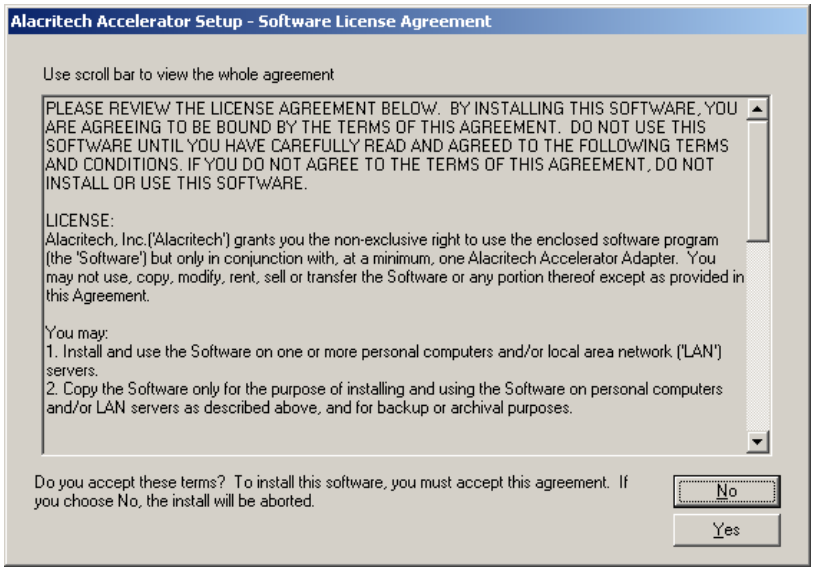
This section covers the procedures for installing the software required for the Accelerators. Follow the appropriate procedure for your type of installation.

Note: Running the Alacritech Setup program is the only way to correctly initially install Alacritech Accelerator drivers for Windows. Following initial installation, the automated Add/Remove Hardware Wizard will discover additional Accelerators.

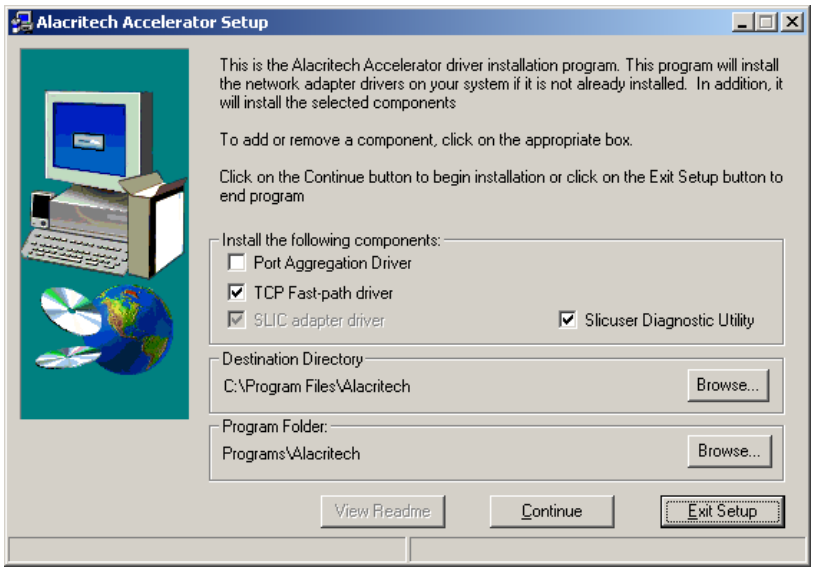
Note: The drivers cannot be installed during the initial installation of Windows. If you leave the Accelerator in your system through the entire Windows installation process, the automated Add/Remove Hardware Wizard will not discover the Accelerator in your system on subsequent reboots, since Alacritech drivers do not ship with Windows.

2.2.1 Installation of the Accelerator without Port Aggregation

1. Insert your **Alacritech Driver Installation CD** into the system.
2. In the **Alacritech Accelerator Setup – Software License Agreement** window, click the **Yes** button if you accept the license agreement.

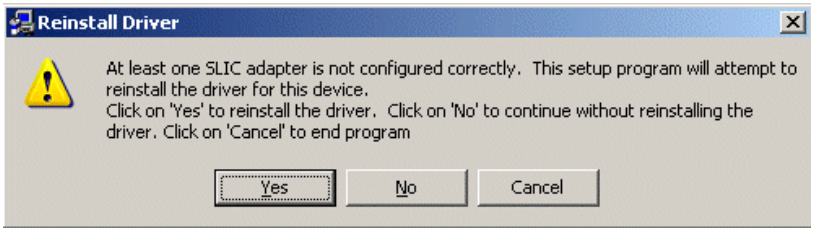

Alacritech Accelerator Setup - Software License Agreement
Use scroll bar to view the whole agreement
PLEASE REVIEW THE LICENSE AGREEMENT BELOW. BY INSTALLING THIS SOFTWARE, YOU ARE AGREEING TO BE BOUND BY THE TERMS OF THIS AGREEMENT. DO NOT USE THIS SOFTWARE UNTIL YOU HAVE CAREFULLY READ AND AGREED TO THE FOLLOWING TERMS AND CONDITIONS. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, DO NOT INSTALL OR USE THIS SOFTWARE.
LICENSE:
Alacritech, Inc.('Alacritech') grants you the non-exclusive right to use the enclosed software program (the 'Software') but only in conjunction with, at a minimum, one Alacritech Accelerator Adapter. You may not use, copy, modify, rent, sell or transfer the Software or any portion thereof except as provided in this Agreement.
You may:
1. Install and use the Software on one or more personal computers and/or local area network ('LAN') servers.
2. Copy the Software only for the purpose of installing and using the Software on personal computers and/or LAN servers as described above, and for backup or archival purposes.
Do you accept these terms? To install this software, you must accept this agreement. If you choose No, the install will be aborted.
No
Yes

3. If you accept the license agreement, the **Alacritech Accelerator Setup** window will appear:


Alacritech Accelerator Setup
This is the Alacritech Accelerator driver installation program. This program will install the network adapter drivers on your system if it is not already installed. In addition, it will install the selected components
To add or remove a component, click on the appropriate box.
Click on the Continue button to begin installation or click on the Exit Setup button to end program
Install the following components:
Port Aggregation Driver
TCP Fast-path driver
SLIC adapter driver
Slicuser Diagnostic Utility
Destination Directory
C:\Program Files\Alacritech
Browse...
Program Folder:
Programs\Alacritech
Browse...
View Readme
Continue
Exit Setup

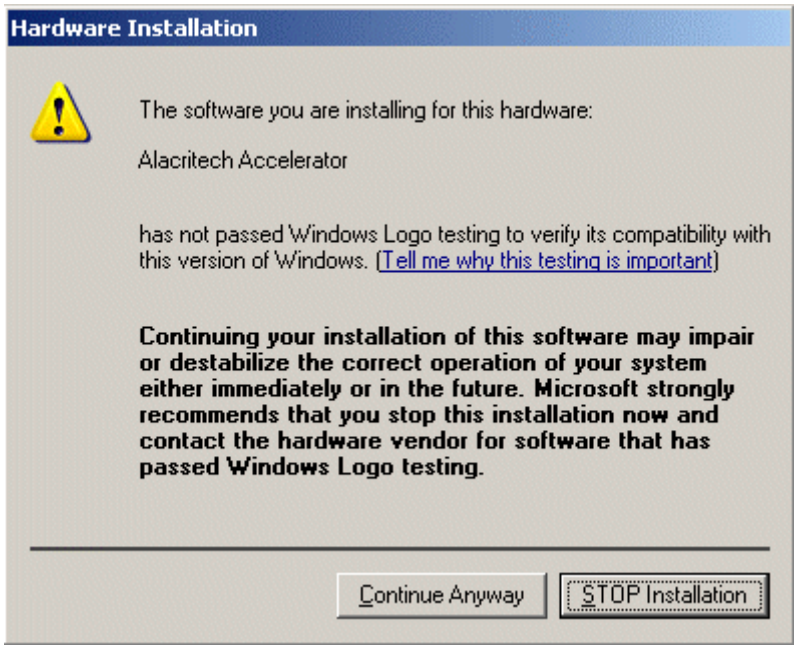
Click the **View Readme** button if you wish to read the latest product information. Otherwise, click the **Continue** button.

4. If a **Reinstall Driver** dialog box appears, click the **Yes** button:


Reinstall Driver
At least one SLIC adapter is not configured correctly. This setup program will attempt to reinstall the driver for this device.
Click on 'Yes' to reinstall the driver. Click on 'No' to continue without reinstalling the driver. Click on 'Cancel' to end program
Yes
No
Cancel

5. A dialog box titled **Digital Signature Not Found** for Windows 2000 or **Hardware Installation** for Windows XP or Windows Server 2003 may appear. This should only occur when using drivers that are not certified through the Microsoft WHQL process. Most official drivers released by Alacritech have appropriate digital signatures, while others, including beta drivers, do not. A missing digital signature does not prevent the Alacritech drivers from working properly on your system.

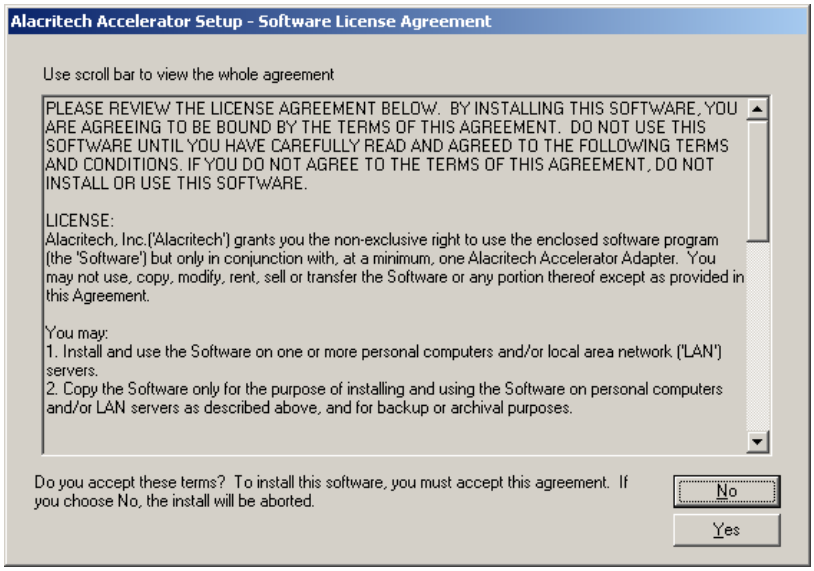
   Click the button titled **Yes** for Windows 2000 or **Continue Anyway** for Windows XP or Windows Server 2003 to install the driver without a digital signature. This dialog box will appear each time the driver is installed for an adapter port. Be sure to click the **Yes** or **Continue Anyway** button each time:


Hardware Installation
The software you are installing for this hardware:
Alacritech Accelerator
has not passed Windows Logo testing to verify its compatibility with this version of Windows. (Tell me why this testing is important)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

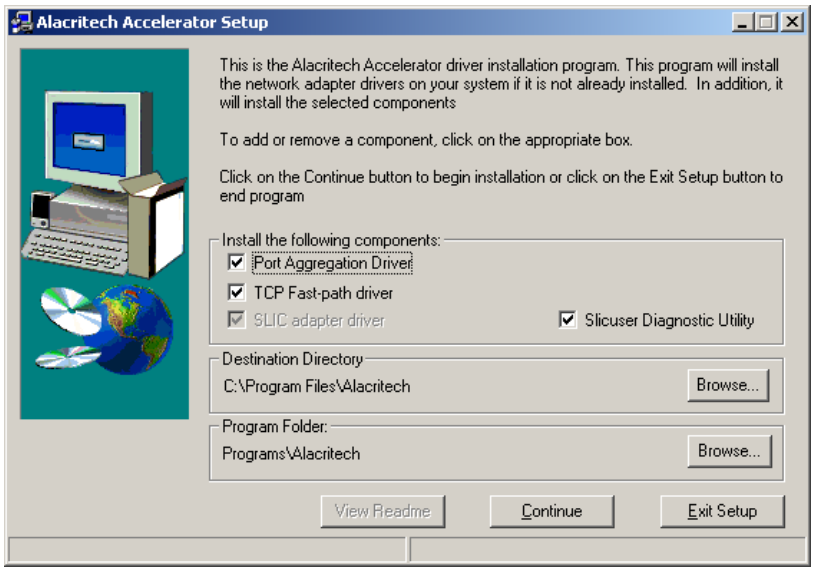
6. Click **Exit** to end the installation process. The user will be prompted to reboot the system.

2.2.2 Installation of the Accelerator with Port Aggregation

1. Insert your **Alacritech Driver Installation CD** into the system.
2. In the **Alacritech Accelerator Setup – Software License Agreement** window, click the **Yes** button if you accept the license agreement.

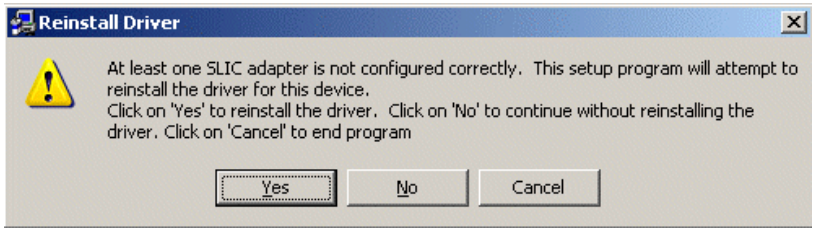

Alacritech Accelerator Setup - Software License Agreement
Use scroll bar to view the whole agreement
PLEASE REVIEW THE LICENSE AGREEMENT BELOW. BY INSTALLING THIS SOFTWARE, YOU ARE AGREEING TO BE BOUND BY THE TERMS OF THIS AGREEMENT. DO NOT USE THIS SOFTWARE UNTIL YOU HAVE CAREFULLY READ AND AGREED TO THE FOLLOWING TERMS AND CONDITIONS. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, DO NOT INSTALL OR USE THIS SOFTWARE.
LICENSE:
Alacritech, Inc.('Alacritech') grants you the non-exclusive right to use the enclosed software program (the 'Software') but only in conjunction with, at a minimum, one Alacritech Accelerator Adapter. You may not use, copy, modify, rent, sell or transfer the Software or any portion thereof except as provided in this Agreement.
You may:
1. Install and use the Software on one or more personal computers and/or local area network ('LAN') servers.
2. Copy the Software only for the purpose of installing and using the Software on personal computers and/or LAN servers as described above, and for backup or archival purposes.
Do you accept these terms? To install this software, you must accept this agreement. If you choose No, the install will be aborted.
No
Yes

3. If you accept the license agreement, the **Alacritech Accelerator Setup** window will appear:


Alacritech Accelerator Setup
This is the Alacritech Accelerator driver installation program. This program will install the network adapter drivers on your system if it is not already installed. In addition, it will install the selected components
To add or remove a component, click on the appropriate box.
Click on the Continue button to begin installation or click on the Exit Setup button to end program
Install the following components:
Port Aggregation Driver
TCP Fast-path driver
SLIC adapter driver
Slicuser Diagnostic Utility
Destination Directory
C:\Program Files\Alacritech
Browse...
Program Folder:
Programs\Alacritech
Browse...
View Readme
Continue
Exit Setup

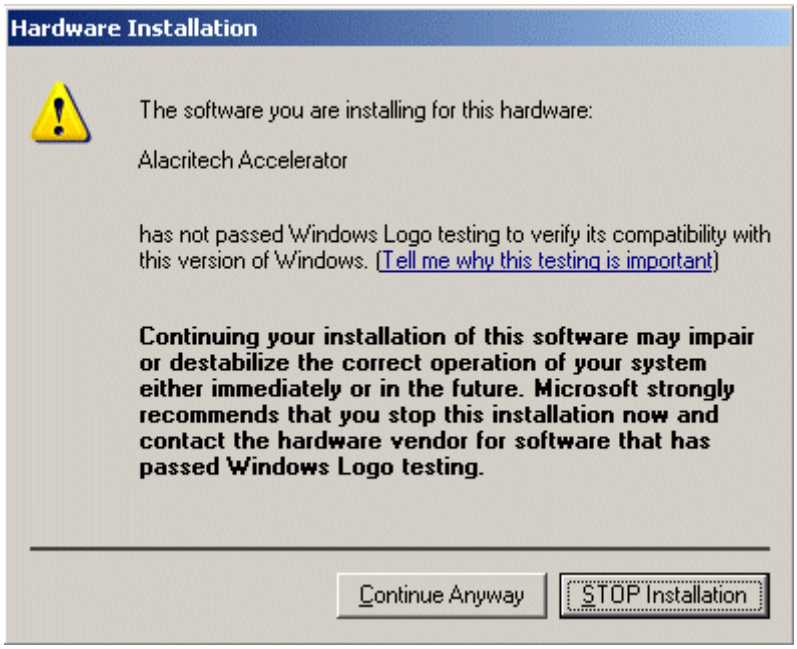
Click the **View Readme** button if you wish to read the latest product information. Otherwise, check the **Port Aggregation Driver** box in the **Alacritech Accelerator Setup** window, and click the **Continue** button.

4. In the **Reinstall Driver** dialog box click the **Yes** button:

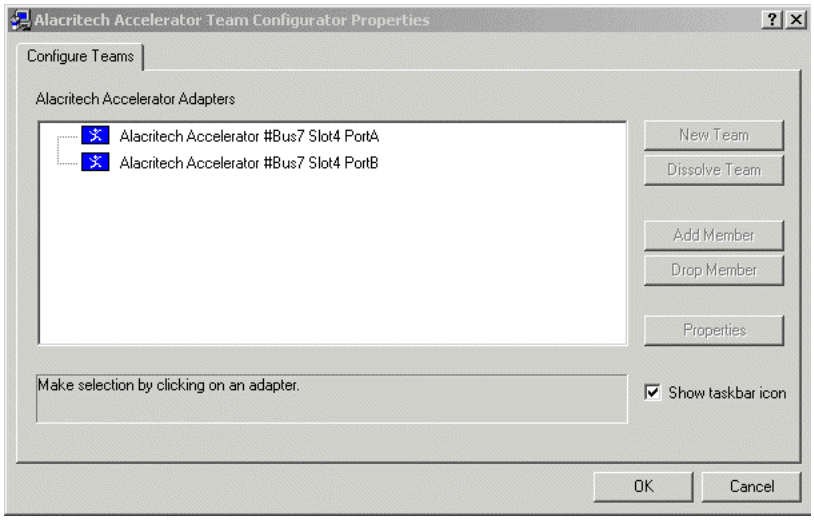

Reinstall Driver
At least one SLIC adapter is not configured correctly. This setup program will attempt to reinstall the driver for this device.
Click on 'Yes' to reinstall the driver. Click on 'No' to continue without reinstalling the driver. Click on 'Cancel' to end program
Yes
No
Cancel

5. A dialog box titled **Digital Signature Not Found** for Windows 2000 or **Hardware Installation** for Windows XP or Windows Server 2003 may appear. This should only occur when using drivers that are not certified through the Microsoft WHQL process. Most official drivers released by Alacritech have appropriate digital signatures, while others, including beta drivers, do not. A missing digital signature does not prevent the Alacritech drivers from working properly on your system.

   Click the button titled **Yes** for Windows 2000 or **Continue Anyway** for Windows XP or Windows Server 2003 to install the driver without a digital signature. This dialog box will appear each time the driver is installed for an adapter port. Be sure to click the **Yes** or **Continue Anyway** button each time:


Hardware Installation
The software you are installing for this hardware:
Alacritech Accelerator
has not passed Windows Logo testing to verify its compatibility with this version of Windows. (Tell me why this testing is important)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

6. The **Alacritech Accelerator Team Configurator Properties** window will appear. If you wish to configure teaming now, consult **Chapter 4**; otherwise, select **Cancel** in the teaming window:



7. When installation completes, you will be asked to restart your system. If you wish to assign IP addresses before rebooting, click **No**. Otherwise, click the **Yes** button. The user will be prompted to reboot the system.

2.3 Uninstalling the Accelerator

2.3.1 Removal of an Accelerator on a Windows 2000 System

To remove an Accelerator from a Windows 2000 system, follow this procedure. Windows XP and Windows Server 2003 systems will disable the driver software automatically. **Take care to remove all software drivers for the card *before* unplugging the adapter.**

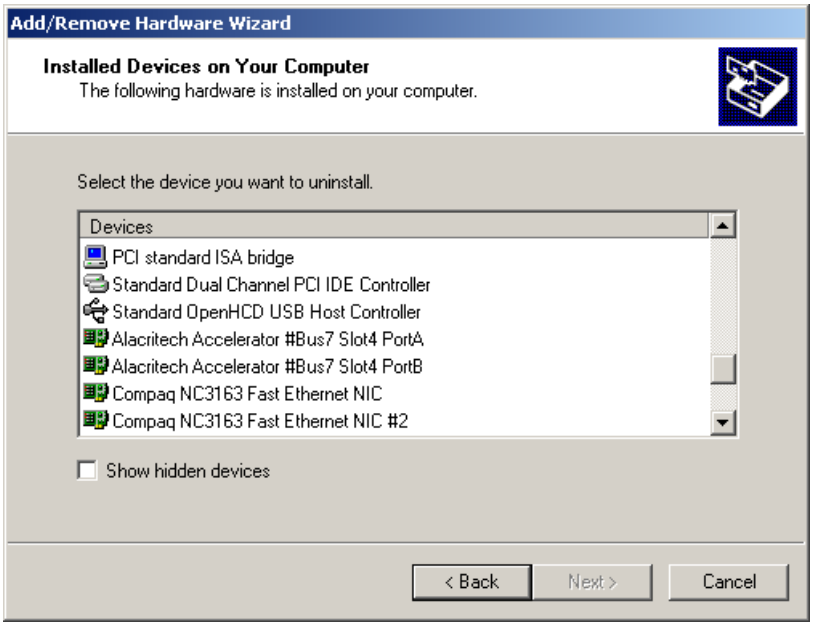
1. Dissolve any existing Accelerator teams (if created).

2. Double-click the **Add/Remove Hardware** icon in the **Control Panel**. An opening screen will appear. Click the **Next** button.

3. Select **Uninstall/Unplug a device** in the selection list and click the **Next** button.

4. Confirm **Uninstall a device** is selected in the selection list and click the **Next** button.

5. After a few seconds, a list of devices will appear. Select the first appropriate **Alacritech Accelerator** or **Alacritech iSCSI Accelerator** from the list and click the **Next** button.


Add/Remove Hardware Wizard
Installed Devices on Your Computer
The following hardware is installed on your computer.
Select the device you want to uninstall.
Devices
PCI standard ISA bridge
Standard Dual Channel PCI IDE Controller
Standard OpenHCD USB Host Controller
Alacritech Accelerator #Bus7 Slot4 PortA
Alacritech Accelerator #Bus7 Slot4 PortB
Compaq NC3163 Fast Ethernet NIC
Compaq NC3163 Fast Ethernet NIC #2
Show hidden devices
< Back
Next >
Cancel

6. Confirm the removal of the device by selecting the **Yes, I want to uninstall this device** item and click the **Next** button.

7. Click the **Finish** button to close the **Add/Remove Hardware Wizard** program.

8. ***IMPORTANT!*** - Follow steps 1 through 6, removing each **Alacritech Accelerator** as described in step 4.

9. Shut down the computer, and unplug the power cable. Failure to do so may endanger you, and may damage the adapter or computer.

Note: Alacritech Accelerators use components that are sensitive to ESD. Proper ESD handling and storage should be followed.

10. Remove the computer cover, and remove the Alacritech Accelerator.

3 Operations and Management

3.1 Overview of Performance Monitoring

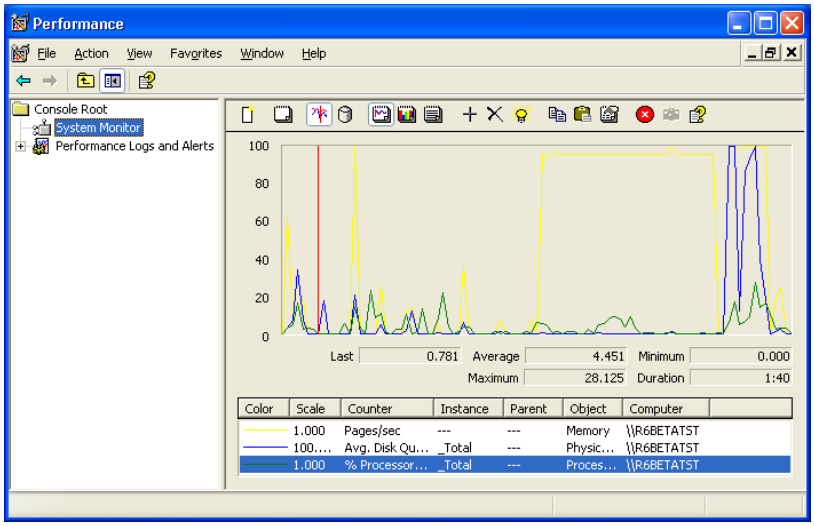
Performance data for an Accelerator can be seen with Performance Monitor, which is located in the Administrative Tools folder on your Windows system. Select the SLIC object in the Performance Monitor program to review SLIC specific counters. Among the counters maintained under the SLIC object is the **FastPath Data Rate**. This counter measures the percentage of TCP/IP traffic that is being processed by the Accelerator as opposed to the traffic that is processed by the host protocol stack. A **FastPath Data Rate** of 95% or higher indicates the accelerator is working properly.

3.1.1 Using the Performance Monitor Application

To check the performance of your system, run Performance Monitor, specifying the variables you wish to monitor. Follow this procedure to check the performance of the Accelerator.

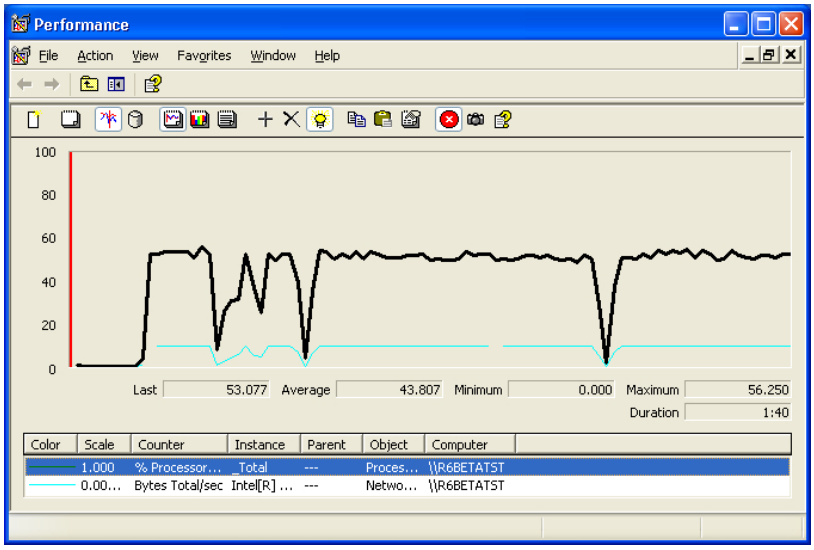
For Windows 2000, run the Performance Monitor application from the Start Menu, located under Settings in the Control Panel folder in the Administrative Tools object. For Windows XP and Windows Server 2003, click the **Start** menu button, and launch the **Run…** menu option. In the dialog box that appears, run the command **perfmon**. Follow the steps below:

1. Select the + button to add objects to the chart:



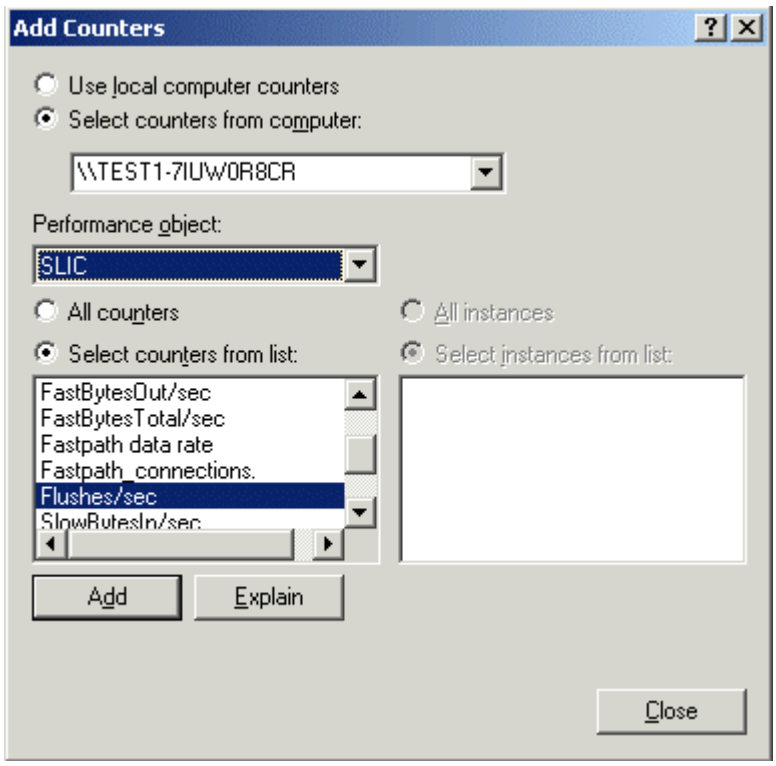
2. In the **Performance Object** field, select **Processor** and in the **Counter** field, select **% Processor Time** and click the **Add** button. Next, in the **Object** field, select **Net** and in the **Counter** field, select **Bytes Total/sec** along with any gigabit adapter in the list of available network interface instances, and click the **Add** button. These objects display both how much CPU time is used on the system and how much data is transferred by the Server process, which is responsible for file sharing.

   Before the Alacritech Accelerator is installed, when clients are generating a lot of traffic to and from the server's file systems, your display may look similar to this:

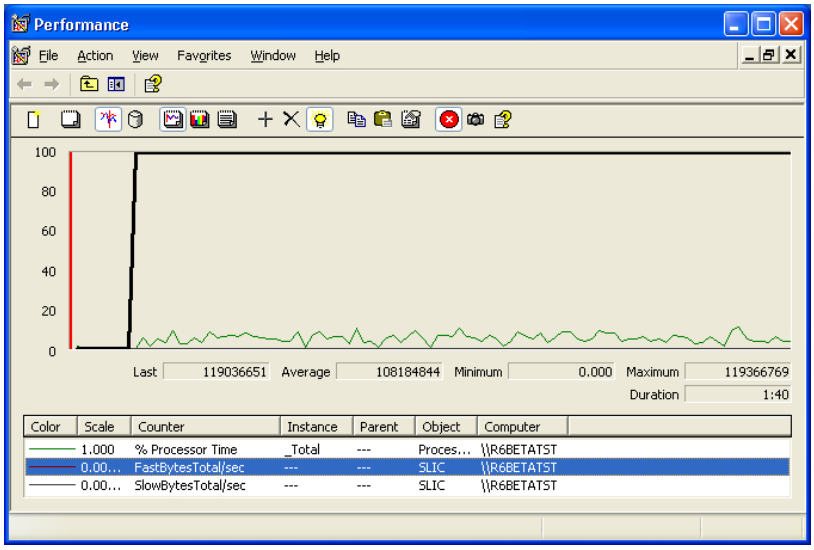


In this example, the CPU usage is over 50% (black, highlighted line). The throughput is not optimal (75MB/s) and occasionally a drop in performance occurs. This shows how a conventional NIC uses lots of CPU to accomplish non-optimal throughput.

3. With an Alacritech Accelerator installed, add Alacritech specific objects to the chart. In the **Object** field, select **SLIC** and in the **Counter** field, select **FastBytesTotal/sec** and click the **Add** button. Next, in the **Object** field, select **SLIC** and in the **Counter** field, select **SlowBytesTotal/sec** and click the **Add** button. FastBytes represents data moving through the Accelerators on-card TCP/IP protocol stack (FastPath) and SlowBytes represent data moving through the host protocol stack, as it does with a conventional network interface card.



4. When running either read or write network tests through an Alacritech Accelerator, your display should look similar to this:



Note the same server's CPU is now at around 5% (green line). Also, the data being transferred as indicated by **FastBytesTotal/sec** is entirely FastPath (black line, highlighted), running at wire speed (119MB/s). **SlowBytesTotal /sec** is non-existent. The percentage of FastPath data on a healthy network should be close to 100%. This indicates that the Alacritech Accelerator is offloading 100% of the traffic from the server's CPU.

If your FastPath results do not indicate similar kinds of performance benefits, take the additional steps indicated in the Problem/Solution table in the Chapter 6.

3.1.2 Explanation of SLIC Performance Monitor Objects

The basic indication of SLIC and network functionality is the amount of data moved through the SLIC protocol stack instead of

through the Windows (host) TCP/IP protocol stack. If most of the data is moving through the SLIC protocol stack, then performance of the server will be optimal. Some reasons why data may not be going through the SLIC protocol stack are:

- Faulty network wiring or bad connections leading to dropped frames and runt packets;
- Inability of older network hardware to autonegotiate properly;
- Extremely high network traffic that causes dropped frames on an intermediate network device such as a switch or hub.

The purpose of the SLIC Performance Monitor objects is to measure the amount of data transmitted using the SLIC protocol stack, or FastPath. Any data that is moved using the host protocol stack instead of the SLIC protocol stack is referred to as SlowPath data. A healthy TCP/IP connection will be put into FastPath state as soon as the connection is established, and will stay in FastPath state until the connection is closed.

As soon as an Alacritech Accelerator finds a problem with a connection such as a dropped frame, the connection is flushed back to the host, and is put under the control of the host protocol stack, SlowPath, until the problem can be resolved. While the connection is in this SlowPath state, all TCP/IP processing is handled by the host and the Alacritech accelerator serves only to move Ethernet frames to and from the network, much like a conventional network interface card. When the host resolves the network problem, for example by a retransmission, the connection is moved into FastPath state and the Alacritech Accelerator once again takes over TCP/IP processing. The FastPath data rate is the best indication of how much data is being transmitted using the SLIC protocol stack and should be at least 95%.

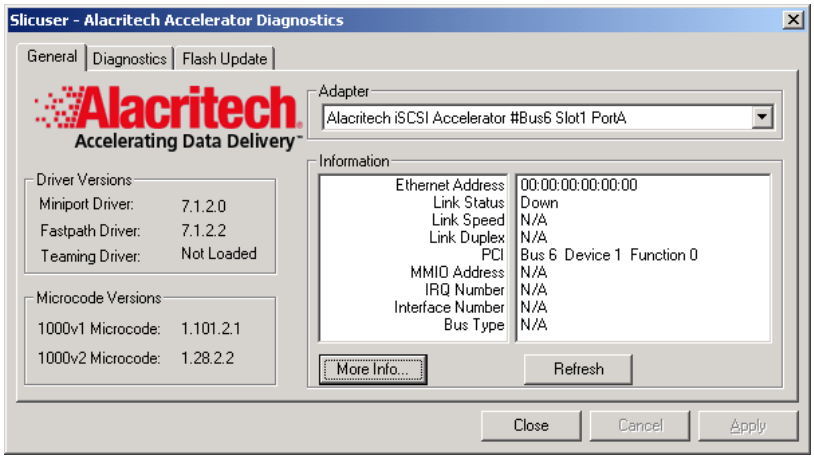
The table below indicates the SLIC objects and counters relevant to the Accelerator for use with the Performance Monitor.

Object	Explanation
Connections/sec	Number of new TCP/IP connections established per second.
Established connections	Total number of TCP/IP connections in Established state.
FastBytesIn/sec	Bytes per second of input data managed by the SLIC protocol stack.
FastBytesOut/sec	Bytes per second of output data managed by the SLIC protocol stack.
FastBytesTotal/sec	Total bytes per second of data managed by the SLIC protocol stack.
FastPath data rate	Percentage of FastPath data (FastPath KB/sec divided by total KB/sec).
FastPath connections	Number of TCP/IP connections in FastPath mode (maximum 4096 for each Accelerator).
Flushes/sec	Number of times per second that the Alacritech Accelerator flushes a connection to the host.
SlowBytesIn/sec	Bytes per second of input data managed by the host.
SlowBytesOut/sec	Bytes per second of output data managed by the host.
SlowBytesTotal/sec	Total bytes per second of data managed by the host.

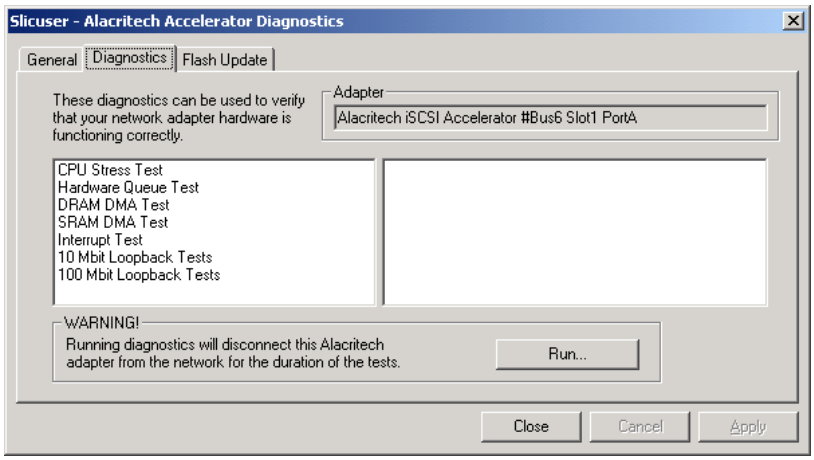
3.2 Running Adapter Diagnostics

Diagnostics can be run on any Accelerator using the following procedure:

1. Run the **slicuser** application from the Start Menu, located under the Program Files folder in the Alacritech folder. The SLIC Adapters window will appear:



2. Select the **Diagnostics** tab:



Note: Running Diagnostics will disrupt all ports of any Accelerator in the server.

3. Click the **Run** button. The adapter will then run through self-test of the IPP and the selected Accelerator. A properly functioning board will display **Passed** for all results. Click the **Close** button to exit the **slicuser** application.

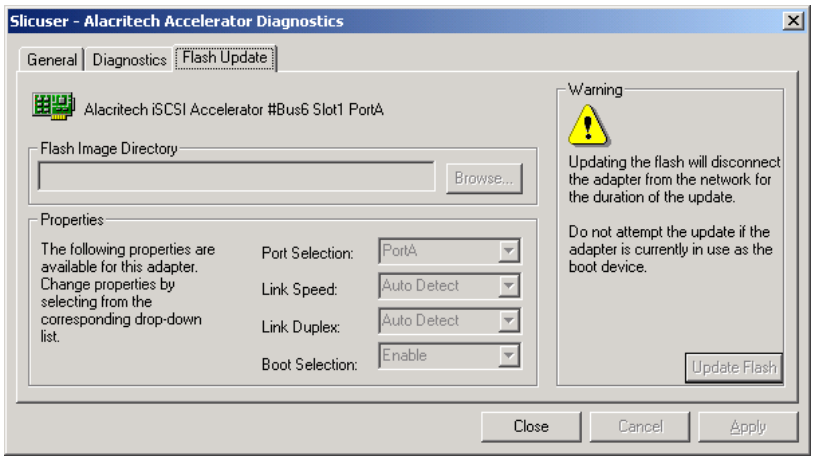
3.3 Updating Flash Code

A new mechanism for flashing code on flash-capable Accelerators is now provided through the **slicuser** application. The PXE/UNDI drivers for Alacritech Accelerators allow PXE and iSCSI software boot solutions to work. Note that these drivers do not include a BIOS-level iSCSI boot driver, and that a third-party iSCSI boot software package is needed for complete iSCSI boot support.

The latest PXE drivers are available from Alacritech's web site in the Support section.

To burn the latest flash code on an Accelerator, follow these steps:

1. Click the **Flash Update** tab in the **slicuser** application.
2. Specify the flash image directory by either entering the appropriate path to the flash files in the **Flash Image Directory** text box or by browsing to the appropriate path by clicking the **Browse** button.
3. Once the path is specified, click the **Update Flash** button to complete the flash process. NOTE: The Accelerator may not be available or operational during the flash update process and will disrupt all ports of the Accelerator being flashed in the server.
4. After flashing the latest PXE drivers, click the **Close** button to exit the **slicuser** application.



3.4 Disabling SLIC TCP/IP Offload on Select Interfaces

In certain environments, such as networks with routing loops, it may be necessary to disable the SLIC TCP/IP Offload feature on the Accelerators in your system. To determine if this is required on any of your Accelerators, please read the Troubleshooting and Support chapter. To disable this feature, use the following procedure:

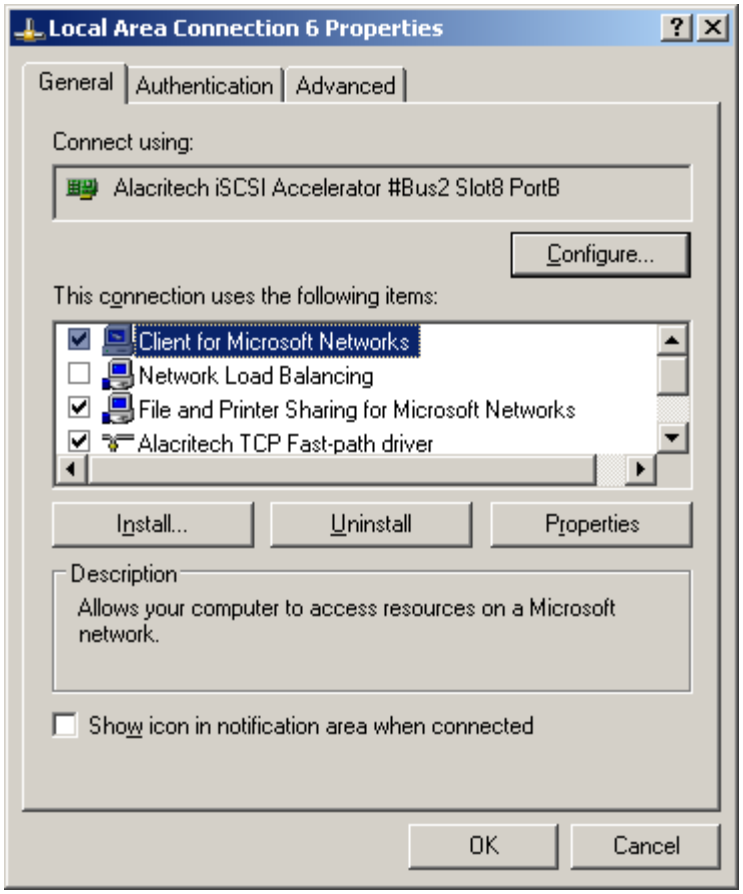
Note: Disabling SLIC TCP/IP Offload will disable the performance benefits of the Accelerator on that interface. This should be done only as required.

1. From the **Start** menu, open the **Network & Dial-up Connections** folder located under the **Settings** menu.
2. Double-click the LAN connection of the interface you wish to disable TCP offload.
3. Click the **Properties** button. Uncheck the box labeled **Alacritech TCP Fast-path driver.** Click **OK**.
4. Restart your computer.

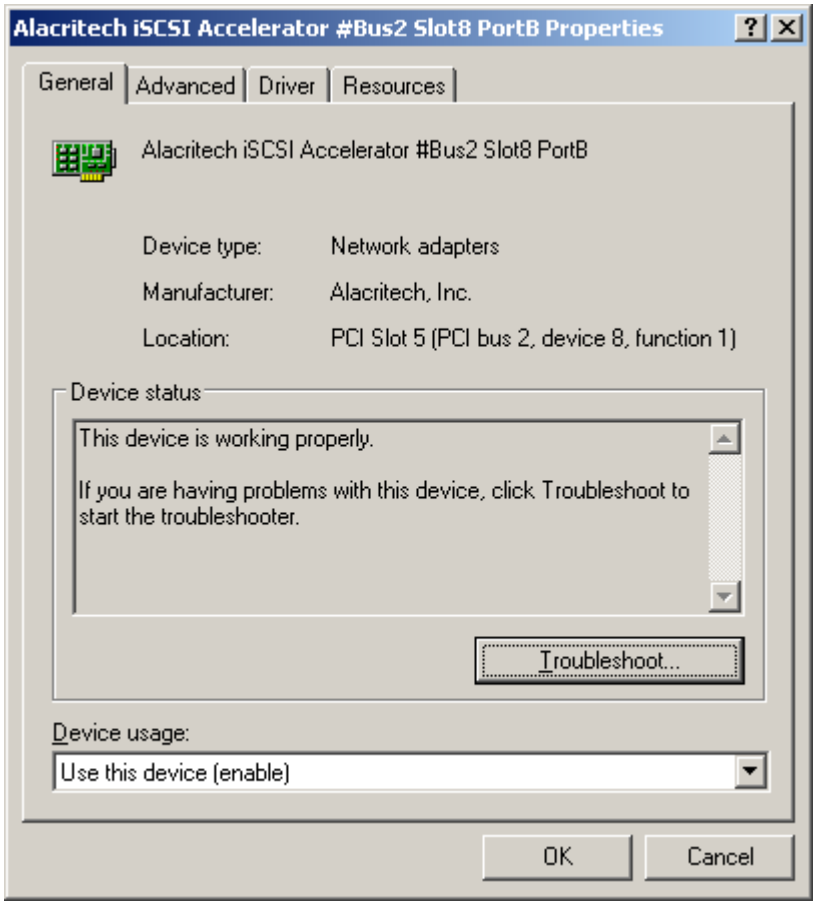
3.5 Configuring Advanced Properties

Alacritech Accelerators support many advanced features such as jumbo frames, VLAN tagging and TCP checksum offload.

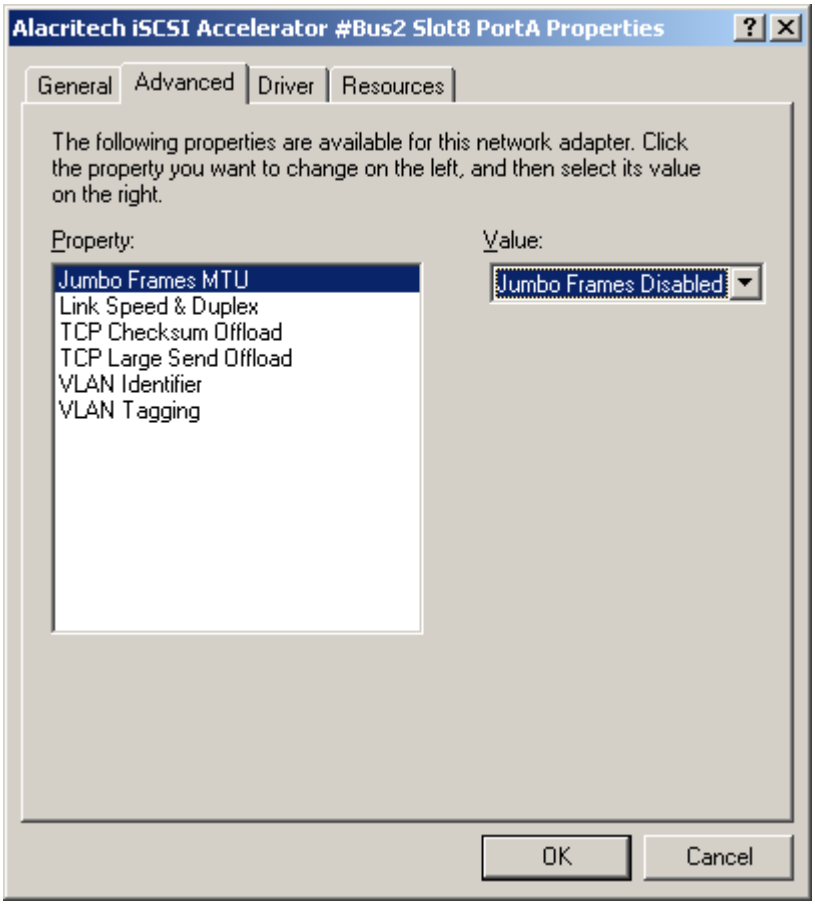
To access the advanced configuration properties for an Alacritech Accelerator, open **Network Connections**, right click on an Alacritech Accelerator and select **Properties**. This will open the Local Area Connection Properties dialog box for the selected Accelerator:



Click on the **Configure…** button under the **General** tab to modify advanced Accelerator features. The Accelerator **Properties** dialog box will appear:



Click on the **Advanced** tab to access the properties that are available for the selected Accelerator:



The following settings are available under the **Advanced** tab:

Jumbo Frames MTU – When enabled, this option provides support for large Media Transmission Units (MTU). The standard Ethernet MTU size is 1500 bytes. The available options for this selection are 9014 and 16128.

The default value for Jumbo Frames MTU is **Jumbo Frames Disabled**.

Link Speed & Duplex – This option allows for the direct setting of the data transmission rate. The default for this setting is Auto Detect. The available options for this setting are shown in the following table:

Setting	Description
10Mbps Full Duplex (copper-based products only)	Sets data rate to a maximum of 10 megabits per second bi-directionally
10Mbps Half Duplex (copper-based products only)	Sets data rate to a maximum of 10 megabits per second unidirectionally
100Mbps Full Duplex (copper-based products only)	Sets data rate to a maximum of 100 megabits per second bi-directionally
100Mbps Half Duplex (copper-based products only)	Sets data transmission rate to a maximum of 100 megabits per second unidirectionally
1000 Mbps Full Duplex	Sets data transmission rate to a maximum of 1000 megabits per second bi-directionally
Auto Detect	The controller will detect the optimum data transmission rate for a given connection

The default value for Link Speed & Duplex is **Auto Detect**.

TCP Checksum Offload – The TCP Checksum Offload option will allow the Accelerator to offload the TCP checksum for TCP data

transmitted and received when the Accelerator has the **Alacritech TCP Fast-path driver** option disabled. Because Alacritech's SLIC Technology offloads the checksum automatically, this option is unused except when FastPath is turned off.

The default value for TCP Checksum Offload is **Disabled**.

TCP Large Send Offload – In a standard network configuration, the TCP stack will break the entire TCP segment down into Ethernet frames. Each frame is then transmitted individually. TCP Large Send Offload allows an entire data buffer to be sent by the Accelerator as a single segment, using only one interrupt.

The TCP Large Send Offload option will allow the Accelerator to perform segmentation offload for TCP data transmitted and received when the Accelerator has the **Alacritech TCP Fast-path driver** option disabled. Because Alacritech's SLIC Technology offloads all TCP data to the hardware automatically, this option is unused except when FastPath is turned off.

The default value for TCP Large Send Offload is **Disabled**.

VLAN Identifier – This setting allows the network administrator to set the VLAN identifier. The VLAN identifier indicates a specific VLAN the Accelerator will connect to. This setting may be set to a value between 1 and 4094.

The default value for VLAN Identifier is **1**.

VLAN Tagging -

This feature allows the use of 802.3ac VLAN Tagging. This standard provides for the insertion of an identifier, known as a **tag**. This tag identifies to which VLAN the frame belongs.

The default for VLAN Tagging is **Disabled**.

4 Configuring Teaming and Failover

4.1 Overview of Teaming and Failover

Teaming, trunking, link aggregation, port aggregation, load balancing, call it what you will. Though these terms are not synonymous, from Alacritech's perspective they mean the same thing – gathering several Ethernet link level connections together to form a single logical IP network connection.

Note: Alacritech's FastPath implementation works specifically with Alacritech's teaming and failover solution. FastPath is not compatible with Microsoft's Network Load Balancing feature.

Alacritech offers several teaming and failover methods:

- Cisco EtherChannel compatible
- IEEE 802.3AD Link Aggregation Group
- Hot standby failover

Given the flexible nature of Alacritech's teaming implementation, it is possible that it may work with other proprietary trunking solutions as well. For more information on our current teaming support, visit our Customer Support web site at:

`http://www.alacritech.com/html/techsupport.html`

It is important to note that EtherChannel and 802.3AD require that the team be configured both on the host, and on the switch that the host connects to.

In a configuration that has one or more Alacritech Accelerators connected to a compatible switch, EtherChannel allows multiple full-duplex Gigabit Ethernet connections to be grouped together into a single logical path between the host server and the switch, creating a high-speed, fault tolerant link that shares a single IP address. For example, four (4) Accelerators can be configured to form a Gigabit EtherChannel with four (4) compatibly configured ports on the switch. The switch distributes frames across the ports in a Gigabit EtherChannel according to an algorithm determined by the switch vendor. Some switches may have several user selectable algorithms, but typically what is used is a hash based on the source and destination Media Access Control (MAC) addresses. If a port within a Gigabit EtherChannel fails, traffic previously carried over the failed port switches to the remaining ports within the Gigabit EtherChannel. In all cases, traffic between any client/server pair is restricted to one port at a time, limiting bandwidth per client to 1 Gbps half duplex or 2 Gbps full duplex. Multiple clients can collectively take advantage of the full 4 Gbps of a four-port trunk group.

Fault tolerance and load balancing is provided for data both to and from the server (instead of just from the server, as with some other port aggregation schemes). This enables bandwidth to be scaled up to 4 Gbps when four (4) Accelerators are connected to a Gigabit EtherChannel-enabled switch.

Note: Alacritech's Teaming implementation does not support the optional Port Aggregation Protocol (PAgP) feature of some EtherChannel and 802.3AD cable switches, nor the 802.3AD LACP protocol. PAgP/LACP facilitates the automatic creation of

link aggregation groups by exchanging packets between channel-capable ports. All EtherChannel or Link Aggregation groups that connect to Alacritech Accelerator teams must be manually configured. The specific details of manual vs. auto configuration are vendor specific. Consult your switch documentation.

Hot-standby failover is a failover/redundancy option (no load-balancing). One Accelerator port is placed online while other ports in the team are offline. If the link for the online port fails, it is taken offline and one of the other ports is set online in its place.

4.2 Recommended Order of Implementation

Because setting up a team correctly can be tricky, and because the results of an invalid configuration can cause bizarre and unpredictable behavior, we recommend the teamed connection be set up in the following sequence:

1. Establish TCP/IP communication over a single Ethernet link. If this is a new installation of an Alacritech Accelerator, it is important that you first establish network connectivity before setting up a team. All other ports that will later be used in the team should be disabled, and not have Ethernet cables connected.
2. If using EtherChannel or 802.3AD, set up the team on the switch according to the vendor's instructions. Once the team is set up on the switch, you will have full network connectivity, as long as you have only one physical connection to the host.
3. Set up the team on the hosts based on the steps below.

4. Connect the remaining Ethernet cables to the appropriate switch and host ports. Verify that you have link on all connections. You should now have a fully functional fault-tolerant network team.

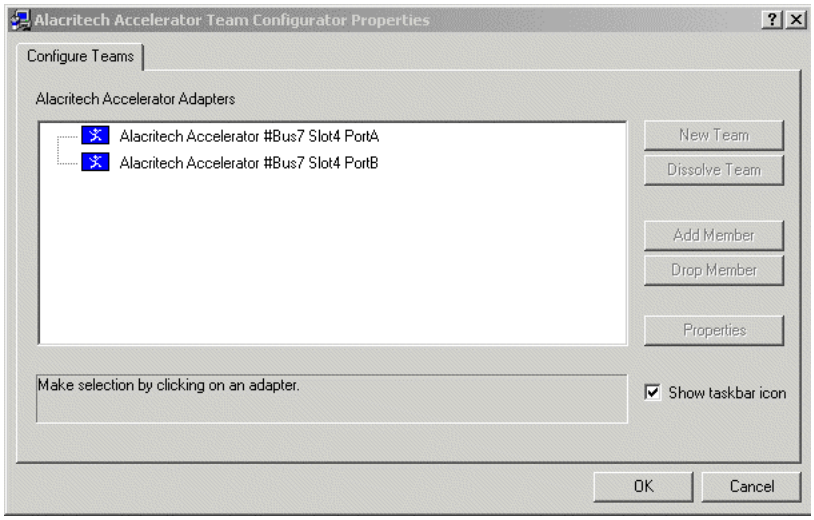
4.3 Windows Teaming Configuration

4.3.1 Configuring Load Balancing

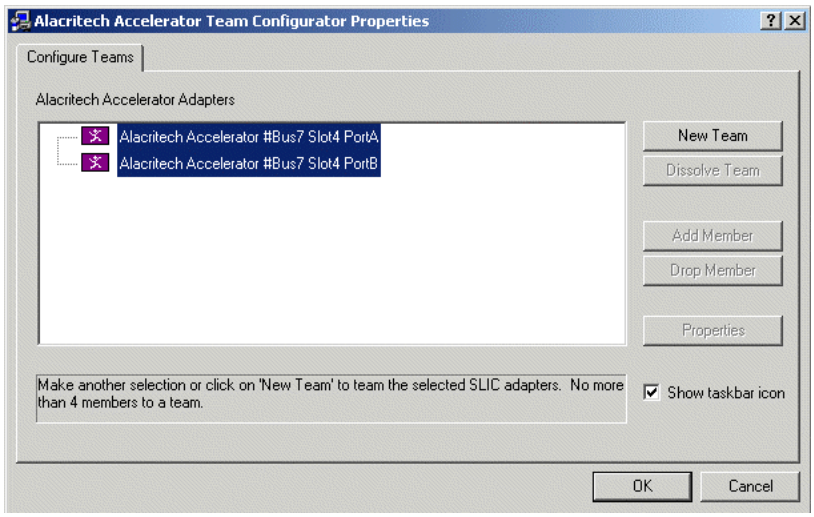
The **Alacritech Accelerator Team Configurator** is used to configure teaming of multiple Alacritech Accelerators together. It can be accessed by clicking the blue SLIC logo located in the Windows toolbar.

If the **Alacritech Accelerator Team Configurator Properties** window is not already open, open it as follows:

1. Open the **Network Properties** window. Right select a connection associated with an Alacritech Accelerator port and click the **Properties** button. Select **Alacritech Accelerator Team Configurator** and click the **Properties** button. The **Alacritech Accelerator Team Configurator Properties** window will appear:

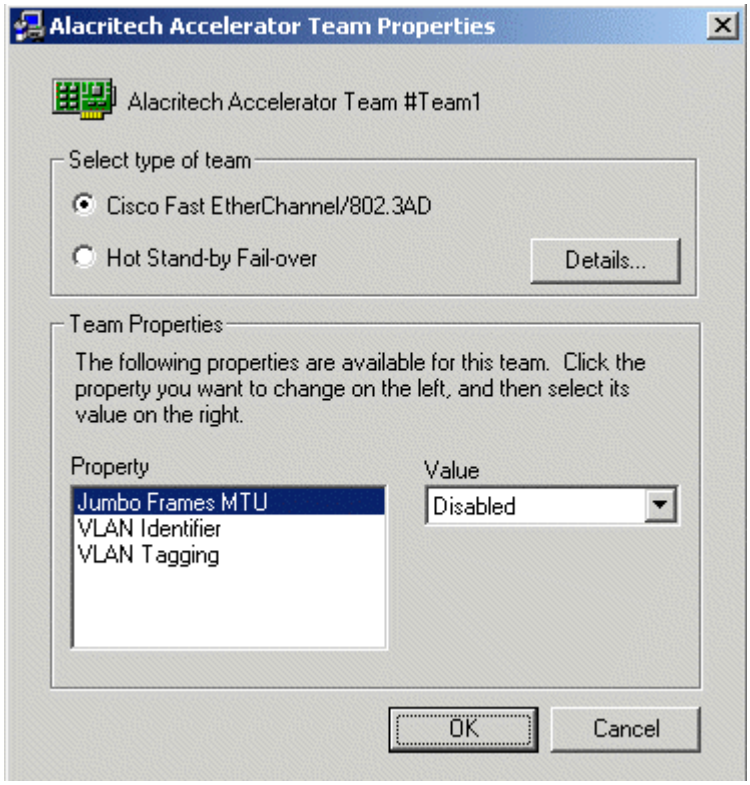


2. To configure a team, select the interfaces you wish to team, and click the **New Team** button:

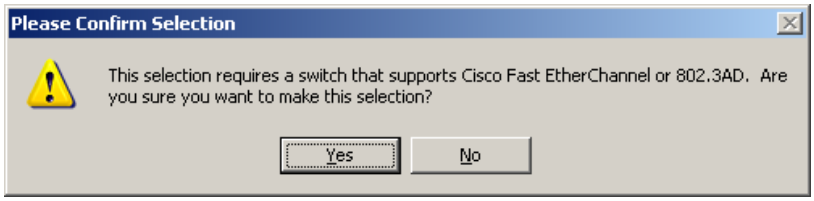

Alacritech Accelerator Team Configurator Properties
Configure Teams
Alacritech Accelerator Adapters
Alacritech Accelerator #Bus7 Slot4 PortA
Alacritech Accelerator #Bus7 Slot4 PortB
New Team
Dissolve Team
Add Member
Drop Member
Properties
Make another selection or click on 'New Team' to team the selected SLIC adapters. No more than 4 members to a team.
Show taskbar icon
OK
Cancel

3. Once the team is created, you must specify the type of teaming or failover the team will use. The default is

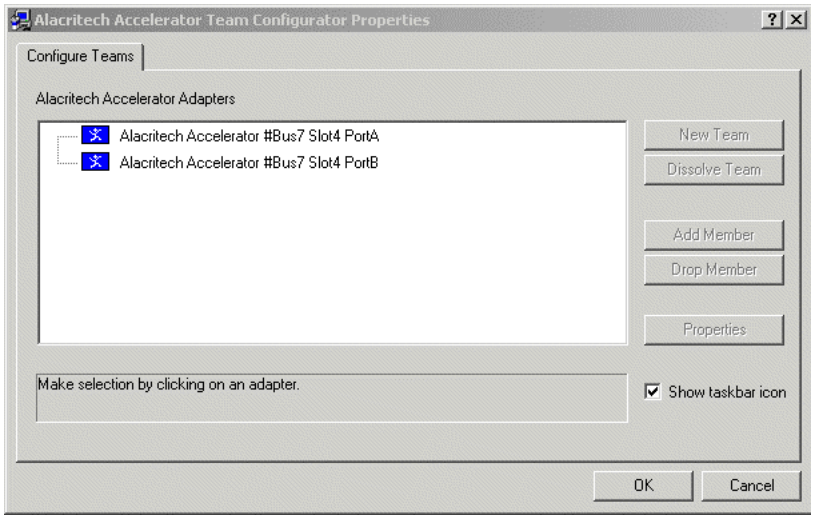
Cisco Gigabit EtherChannel/802.3AD. Select a type of team and click the **OK** button:



4. If **Cisco Gigabit EtherChannel/802.3AD** is selected, you must have a switch that supports one of these protocols. If you do, click the **Yes** button. Otherwise, click the **No** button and select another method:


Please Confirm Selection
This selection requires a switch that supports Cisco Fast EtherChannel or 802.3AD. Are you sure you want to make this selection?
Yes
No

5. A new Virtual Miniport Adapter for the team will appear in the window and in the **Network & Dial-up Connections** folder located under the **Settings** menu. Click the **OK** button to continue:



When installation completes, you will be asked to restart your system. If you wish to assign an IP address to the new teamed interface before rebooting, select **No**. Otherwise, Click the **Yes** button to reboot and activate Alacritech SLIC TCP/IP Offload.

Note: A team can have up to four member interfaces, and these interfaces may be on up to four cards.

Note: Remember to configure the switch ports as a Port Aggregation Team. The use of EtherChannel or 802.3AD Link Aggregation requires cooperation between the switch and the cards.

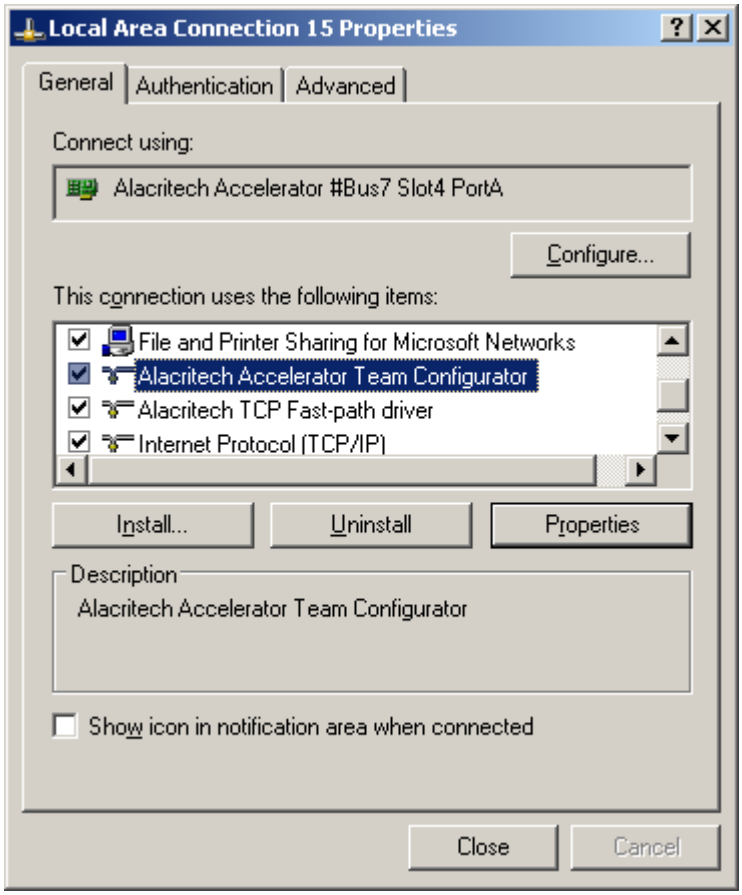
4.3.2 EtherChannel Configuration Guidelines and Restrictions

- If you disable a port in a team, it is treated as a link failure and its traffic is transferred to one or more of the remaining ports in the team.
- Configure all ports in a team to operate at the same speed and duplex mode (full or half duplex).
- Ensure that all ports in a team have the same configuration on both ends of the link.
- Alacritech's EtherChannel implementation does not support PAgP. Switch ports should be configured in the **on** mode.

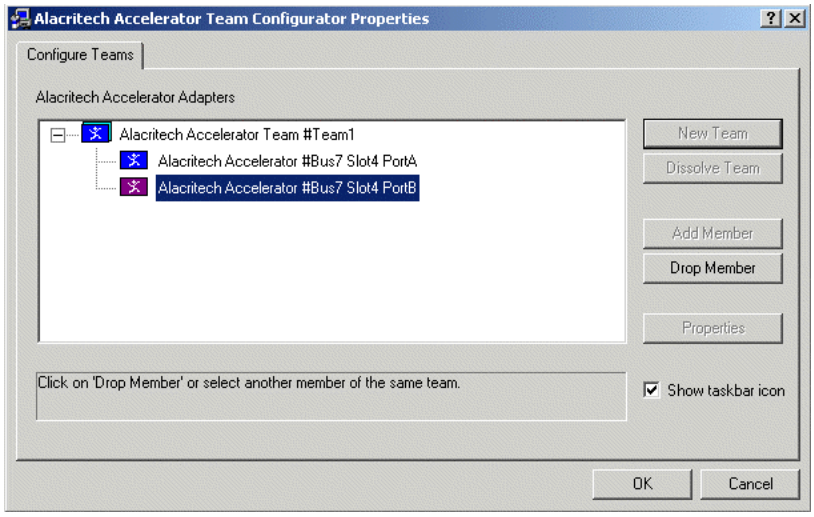
4.3.3 Removing Teaming

1. From the **Start** menu, open the **Network & Dial-up Connections** folder located under the **Settings** menu.
2. Double-click a physical LAN connection for the team you wish to reconfigure.

3. Check the Alacritech SLIC Team Configurator box, select the entry, and click the **Properties** button:

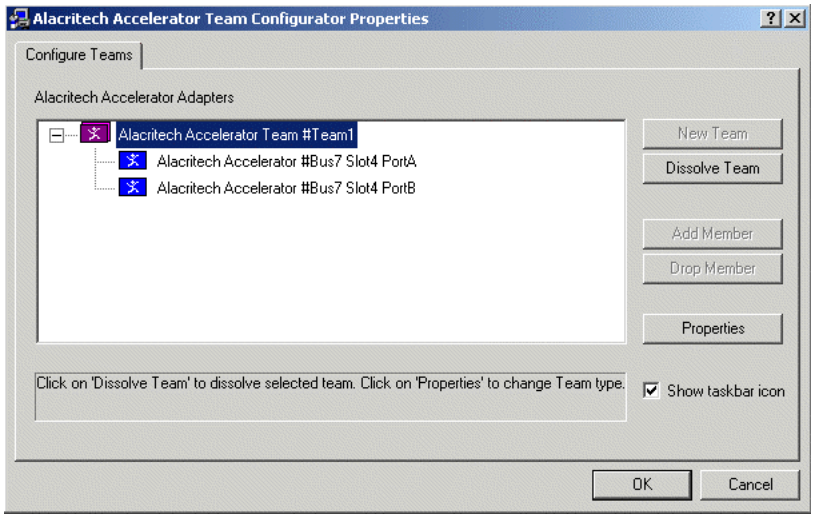


4. Select the entry or entries you wish to remove from the team, and click the **Drop Member** button. Conversely, you may select the entries you wish to add to the team and click the **Add Member** button. Click the **OK** button when you are done:



Note: When a team is established, team member configuration information such as IP, DNS and WINS assignments is not assumed by the virtual miniport adapter. The new team interface assumes DHCP. You must configure the virtual miniport adapter with the proper information if you do not wish to use DHCP.

5. If you wish to remove a team, select the entry for the team, and click the **Dissolve Team** button. Removing the next to the last member of the team with the **Drop Member** button has the same effect:



5 Alacritech Accelerator Installation in Windows Powered NAS Appliance

5.1 Installation Overview

This chapter address issues specific to the installation of an Alacritech Accelerator in a Windows Powered NAS appliance. The procedures outlined in this chapter cover the following types of situations:

- Installation of the Accelerator during a new install
- Replacement of the existing network adapter with a new Alacritech Accelerator in a previously configured system
- Addition of an Alacritech Accelerator to a previously configured system

Note: Alacritech's SLIC Technology requires the installation of additional components not typically required by a network adapter in order to support the TCP offload capabilities of the server accelerator. All software installations must be done with the Alacritech Setup utility typically found on the Alacritech Driver Installation CD.

5.2 Adapter and Driver Installation

This section covers the procedures for installing Alacritech Accelerators. Follow the appropriate procedure for your type of installation.

Note: Running the Alacritech Setup program is the only way to correctly install Accelerator drivers for Windows. Following initial installation, the automated Add/Remove Hardware Wizard will discover additional Accelerators.

Note: The drivers cannot be installed during the initial installation of Windows. If you leave the Accelerator in your system through the entire Windows installation process, the automated Add/Remove Hardware Wizard will not discover the Accelerator in you system on subsequent reboots, since Alacritech drivers do not ship with Windows.

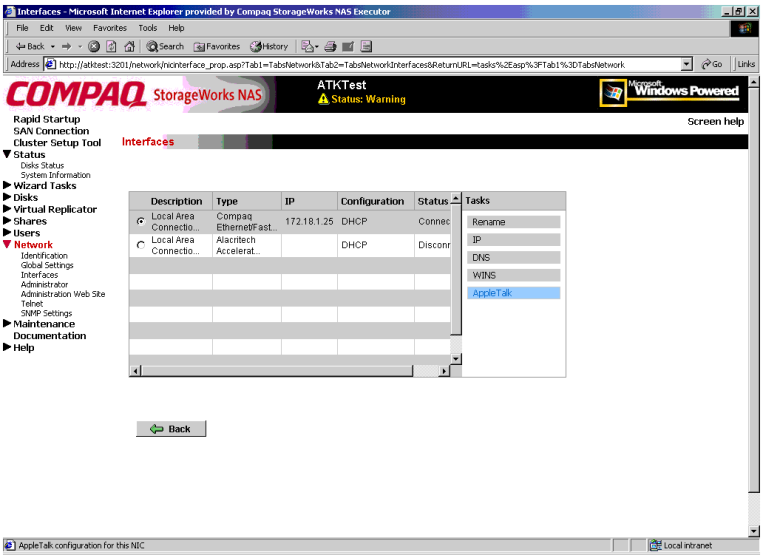
5.2.1 Installation of an Alacritech Accelerator in a Windows Powered NAS Appliance

These procedures outline the steps required to install an Alacritech Accelerator in a Windows Powered NAS appliance. It will be necessary to attach a keyboard, monitor, and mouse to enable the installation of the Alacritech drivers on the NAS appliance.

1. If this system has been previously configured, make backups prior to commencing these activities.
2. If this is a new system installation, perform initial configuration activities, following procedures outlined in the Windows Powered NAS documentation.
3. Turn off and unplug the computer. Failure to do so could endanger you, and may damage the computer.

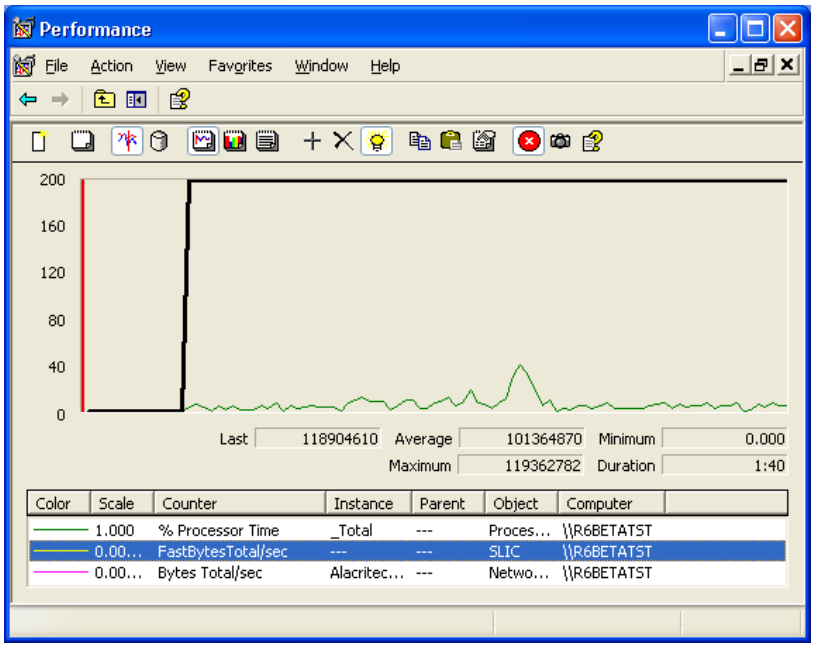
Note: Alacritech Accelerators and other option cards use components that are sensitive to ESD. Proper ESD handling and storage should be followed.

4. Open the system cover or PCI bus access door to access the PCI slots.
5. Install the Alacritech Accelerator in a free slot. If installing more than one Alacritech accelerator, it may be necessary to remove other NICs.
6. Close and latch the cover or PCI bus access door.
7. Attach monitor, keyboard, and mouse to the appropriate ports.
8. Power up system and install Alacritech software following the procedures in Chapter 2 from the previously attached monitor, keyboard, and mouse.
9. Power down, remove keyboard, and mouse.
10. Power up system and follow standard procedures to configure the interface.


Interfaces - Microsoft Internet Explorer provided by Compaq StorageWorks NAS Executor
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://atktest:3201/network/nicinterface_prop.asp?Tab1=TabsNetwork&Tab2=TabsNetworkInterfaces&ReturnURL=tasks%2Easp%3FTab1%3DTabsNetwork
Go Links
COMPAQ StorageWorks NAS
ATKTest
Status: Warning
Microsoft Windows Powered
Screen help
Rapid Startup
SAN Connection
Cluster Setup Tool
Status
Disks Status
System Information
Wizard Tasks
Disks
Virtual Replicator
Shares
Users
Network
Identification
Global Settings
Interfaces
Administrator
Administration Web Site
Telnet
SNMP Settings
Maintenance
Documentation
Help
Interfaces
Description
Type
IP
Configuration
Status
Tasks
Local Area Connectio...
Compaq EthernetFast...
172.18.1.25
DHCP
Connec
Local Area Connectio...
Alacritech Accelerat...
DHCP
Disconr
Rename
IP
DNS
WINS
AppleTalk
Back
AppleTalk configuration for this NIC
Local intranet

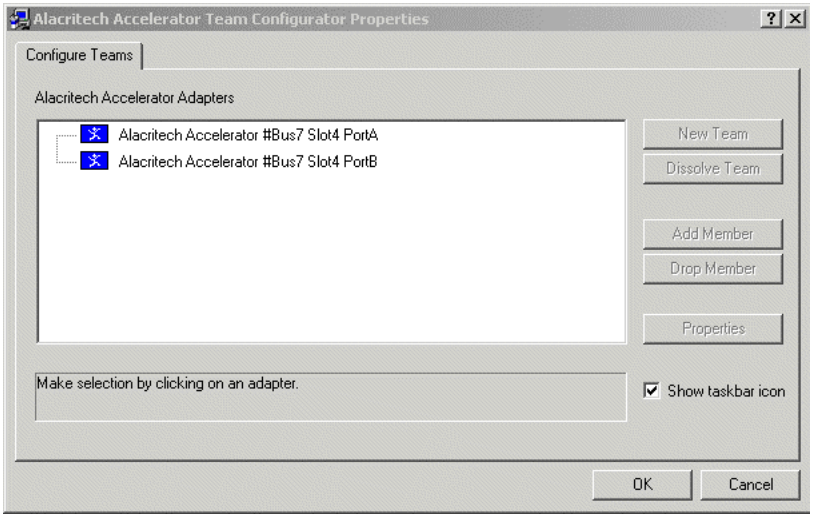
5.3 Performance Monitoring

The performance of an Alacritech Accelerator can be monitored using the Windows Performance Monitor tool, **perfmon**. Because the Windows Powered NAS appliance does not typically have its own display, it is necessary to access `perfmon` on the NAS appliance through Terminal Services. It is not possible to remotely monitor performance on a Windows Powered NAS appliance. Refer to Chapter 3 of this guide for complete details on the Alacritech performance monitoring objects.



5.4 Adapter Teaming

Alacritech Accelerator ports can be teamed together to provide fault tolerance and ease of administration when multiple ports or adapters are installed in Windows Powered NAS appliances. The Alacritech Accelerator Team Configurator utility is accessed by opening up a terminal services session on the NAS appliance and then by running the Alacritech teaming from the network properties screen. The adapter teaming option must be installed to use this option. Refer to Chapter 4 of this guide for complete teaming details.



6 Troubleshooting and Support

6.1 Alacritech Automated Customer Support

You can reach Alacritech's automated support service 24 hours a day, every day. The service contains the most up-to-date information about Alacritech products. You can access the most current drivers, installation instructions, troubleshooting information, and general product information.

Support: http://www.alacritech.com/html/techsupport.html

Corporate: http://www.alacritech.com/

6.2 README Files on CD-ROM

For more information about known issues, open bugs or other integration problems with Microsoft Windows drivers, see the readme.html documentation and RelNotes.txt release notes. To view the files, go to the **Alacritech Driver Installation CD** and open it with any web browser or text editor.

6.3 Troubleshooting Overview

This chapter describes specific problems with installation or use that may arise and their solutions. It covers the following issues:

- Installation Problems
- Event Log Errors
- Connectivity Problems
- Performance Problems

- Miscellaneous Issues About SLIC Technology

6.4 Installation Problems

This section covers errors and problems surrounding installation only. For other problems, please see the other sections in this chapter.

Problem	**Solution**
Error message: *"Setup cannot find OEMSETUP.INF or OEMSETNT.INF"*	• Make sure that you are attempting to install from the Adapters tab of the Network Control Panel Applet (NCPA). • Ensure that you are specifying the proper drive letter for your CD-ROM drive.
Error message: *"No SLIC adapters found"*	Make sure that the Accelerator has been correctly installed in a PCI slot and that the PCI slot is enabled (some PCI hot-plug capable systems will not enable PCI slots unless the slot fastener is secured).

6.5 Event Log Errors

This section covers entries written to the Event Log. You can view the Event Log from the Event Viewer located in the Administrative Tools folder on the Start Menu, located under Programs.

Problem	**Solution**
Event Log reports *"SLIC<x> Has determined that the adapter is not functioning properly"*	• Run Diagnostics from NCPA. See the procedure in Chapter 3. • Contact Alacritech technical support for assistance. This is probably the result of a malfunctioning adapter.
Event Log reports *"SLIC<x>: Could not find an adapter"*	On Windows machines, network cards must remain in the same slot where they were installed. Check that the card has not been moved to another slot. If it has, then either: ◆ Move it back to its original slot, or ◆ Uninstall the appropriate Accelerator(s) from the adapters tab of the NCPA, reboot, and then reinstall.

Note: If a peripheral card with a PCI bridge chip was installed on your system, the bus numbering may have been changed and the system will not be able to locate your Accelerator. In this case, uninstall the Accelerator(s) and then re-install.

Problem	Solution
Event Log reports *"The Alacritech Accelerator service failed to start due to the following error: The system cannot find the file specified."*	This problem can occur when the adapter is installed during a concurrent system installation. It can be fixed by performing a driver update. See the "Software Installation" section in Chapter 2.

6.6 Connectivity Problems

This section covers problems with network connectivity.

Problem	Solution
There is no connectivity at all with other computers on the network. Pinging does not work.	• Make sure that the cables are attached securely at both RJ-45 connections (adapter and switch) and that the network cable is otherwise functional. • Make sure that the network cables are plugged into the correct port of the adapter. The lowest numbered SLIC interface in the system will correspond to the port marked "A" on the card. (SLIC1 corresponds to port

Problem	Solution
	A, SLIC2 to port B, etc.) • Check the LED indicators on the adapter. Each port has LEDs for link/link speed and activity. These lights help indicate if there is a problem with the adapter, switch or cable. Refer to the "LED Function Indicators" chart below.
Problem	**Solution**
TCP connections can be established to other systems on the same subnet, but connections cannot be established to systems on the other side of a router.	If you have an Accelerator and another brand adapter installed on your system, AND your network is configured such that the route from your system to the remote system is different than the route from the remote system back to your system (a routing loop), then it may not be possible to establish a TCP connection. There are three ways to solve this problem: 1. Replace the existing adapter in your system with an Alacritech Accelerator, or 2. Reconfigure your network to eliminate the routing loop, or 3. Disable TCP/IP Offload on the interface(s) associated with the routing loop by following the instructions specified in "Disabling SLIC TCP/IP Offload on Select Interfaces" in Chapter 3.

6.6.1 Alacritech 1000x1 Server and Storage Accelerator and SES1001T iSCSI Accelerator LED Function Indicators

LED	Indication	Meaning
ACT	Off	The Accelerator is not sending or receiving network data.
	Flashing or On	The Accelerator is sending or receiving network data.
1000	Off	Either the Accelerator or the switch (or both) are not receiving power, the cable connection between them is bad, or the link state is not set to 1000 Mbps.
	Green	A 1000 Mbps link has been established.
100	Off	Either the Accelerator or the switch (or both) are not receiving power, or the link state is not set to 100 Mbps.
	Green	A 100 Mbps link has been established.
10	Off	Either the Accelerator or the switch (or both) are not receiving power, or the link state is not set to 10 Mbps.
	Green	A 10 Mbps link has been established.

6.6.2 Alacritech 1000x1F Server and Storage Accelerator and SES1001F iSCSI Accelerator LED Function Indicators

LED	Indication	Meaning
ACT	Off	The Accelerator is not sending or receiving network data.
	Flashing or On	The Accelerator is sending or receiving network data.
LNK	Off	Either the Accelerator or the switch (or both) is not receiving power, or the fiber optic cable connection between them is faulty.
	Green	The Accelerator and the switch are receiving power; the fiber optic cable connection between them is good, and a 1000 Mbps link has been established.

6.6.3 Alacritech SEN2002XT, SEN2001XT, SES2002XT and SES2001XT Accelerator LED Function Indicators

LED	Indication	Meaning
ACT/LNK	Green On	The port is connected to a valid link partner.
	Green Flashing	The Accelerator is sending or receiving network data.
	Off	The Accelerator is not connected to a valid link partner.
10/100/1000	Off	A 10 Mbps link has been established (if the ACT/LNK LED is on or flashing).
	Green	A 100 Mbps link has been established.
	Yellow	A 1000 Mbps link has been established.

6.6.4 Alacritech SEN2002XF, SEN2001XF, SES2002XF and SES2001XF Accelerator LED Function Indicators

LED	Indication	Meaning
LNK	Green On	The Accelerator and the switch are receiving power; the fiber optic cable connection between them is good, and a 1000 Mbps link has been established.
	Off	Either the Accelerator or the switch (or both) is not receiving power, or the fiber optic cable connection between them is faulty
ACT	Yellow Flashing	The Accelerator is sending or receiving network data.
	Off	The Accelerator is not sending or receiving network data.

6.7 Performance Problems

This section covers issues surrounding the performance increase that should occur with the Accelerator installation.

If you suspect performance degradation, follow the steps in Chapter 3 to check your server's performance.

A low FastPath data rate will result in lower performance and is usually the result of a faulty network connection. If the FastPath data rate is high, then the Accelerator is working properly and the performance problems of your system are probably not related to networking (a bottleneck in the disk subsystem for example).

Problem	Solution
Performance improvements of the Accelerator are not apparent.	• Look at the Properties for an Alacritech accelerator listed in the Network and Dial-Up Connections window and verify that the Alacritech TCP Fast-path driver is both listed and checked. • Make sure that your clients are connected to the server using TCP/IP instead of other protocols such as NetBEUI or IPX/SPX. Windows 9x systems will use NetBEUI or IPX/SPX by default if possible. This can be prevented by ensuring that TCP/IP is installed on the clients and then either removing NetBEUI and IPX/SPX on the server or disabling them in the bindings tab of the NCPA. • Use the Performance Monitor application as described in Chapter 3 to verify the FastPath performance of your server.

6.8 Miscellaneous Problems

This section covers problems that cannot be categorized into one of the other sections in this chapter.

Problem	Solution
Netmon or other network monitoring	The Alacritech SLIC TCP/IP Offload accelerates network processing by

software does not work properly with an Alacritech Accelerator installed.	offloading protocol processing to the \ Accelerator. As a result, protocol headers are processed and then stripped off by the network adapter. Network monitoring software running on the computer itself will not work properly in this environment. The two ways to handle this are: • Monitor your network using an external monitoring sniffer, or • Disable SLIC TCP/IP Offload on the interface that you intend to monitor by following the instructions specified in "Disabling SLIC TCP/IP Offload on Select Interfaces" in Chapter 3.

Problem	Solution
Network Monitoring (either Microsoft or 3rd party) does not work through an Alacritech Accelerator.	Network Monitoring applications require packet access to the network, and are incompatible with the session layer interface provided by the SLIC TCP/IP Offload. In order to use Network Monitoring with an Accelerator, you must disable SLIC TCP/IP Offload on the interface through which you wish to use for Network Monitoring. To do this, follow the instructions specified in "Disabling SLIC TCP/IP Offload on Select Interfaces" in Chapter 3.
Port aggregation or failover software does not work through an Alacritech Accelerator.	Port Aggregation software needs to be aware of the session layer interface provided by the SLIC TCP/IP Offload. The only trunking software compatible with the Accelerator's SLIC TCP/IP Offload is the Alacritech Port Aggregation software. To do this, follow the instructions specified in Chapter 4.
Firewall software does not work through an Alacritech Accelerator.	Firewall applications require packet access to the network, and are incompatible with the session layer interface provided by the SLIC TCP/IP Offload. In order to use a firewall with an Accelerator, you must disable SLIC TCP/IP Offload on the interface through which you wish to use for the firewall. To do this, follow the instructions specified in "Disabling SLIC TCP/IP Offload on Select Interfaces" in Chapter 3.
The server does not boot on a computer	Alacritech Accelerators are incompatible with Compaq SmartStart version 4.50 and

running Compaq SmartStart.	earlier. The system will not boot if SmartStart version 4.50 or earlier is run with an Accelerator installed. Alacritech Accelerators are compatible with more recent releases of SmartStart.
When uninstalling the Alacritech TCP Fast-path driver, an error dialog box appears with the message: "Could not uninstall the Alacritech TCP Fast-path driver component. The error is 0x800F020B"	This is an error generated by Windows, not by the Alacritech software. This message may also appear when attempting to uninstall Microsoft's TCP/IP even without Alacritech's TCP Fast-path driver being installed. This error dialog box can be safely ignored.

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